9-20-05

DAC

EV712467899US

I hereby certify that this correspondence is being deposited with the U.S. Postal Service as Express Mail, Airbill No. EV712467899US, in an envelope addressed to: MS Petition, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below.

Dated: 9/19/2005 Signature: Mike Navarro
(Mike Navarro)

Docket No.: 427008007US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE #10

In re Patent Application of:
Heng et al.

Application No.: 09/254,521

Filed: March 8, 1999 Art Unit: 2877

For: MICRO DEFECTS IN SEMI-CONDUCTORS Examiner: H. Q. Pham

PETITION FOR REVIVAL OF AN APPLICATION FOR PATENT ABANDONED UNINTENTIONALLY UNDER 37 CFR 1.137(b)

MS Petition
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The above-identified application was held to be abandoned for allegedly failing to timely file a proper reply to a notice or action by the United States Patent and Trademark Office. In accordance with 37 C.F.R. § 1.137(b), the applicants hereby petition to revive the patent application referenced above as supported by the Declaration of David A. Jackson enclosed herein.

1. STATEMENT OF UNINTENTIONAL DELAY

The present application was incorrectly held to be abandoned for failing to respond to an Office Action dated 5 January 2000. As set forth in the enclosed Declaration of David A. Jackson, Mr. Jackson avers to the following: (a) he filed a response to this Office Action on 5 May 2000 with a one-month extension of time and the appropriate fee; (b) he filed a first status inquiry on July 23, 2003, and a second status inquiry on April 16, 2004; (c) he did not receive a reply to either of the status inquiries; and (d) he did not receive a

Notice of Abandonment. Mr. Jackson also affirmatively states that the entire delay in filing the required reply until the filing of a grantable petition pursuant to this paragraph was unintentional. Moreover, during due diligence for a financial offering by the current owner of the present application (Accent Optical Technologies, Inc.), the undersigned representative held a teleconference with Mr. Jackson on 18 March 2004 in which Mr. Jackson stated that the present application was pending in the United States Patent and Trademark Office at that time.

On 6 October 2004, Mr. Jackson transferred the physical file for the present application and the responsibility for prosecuting the present application to Mr. Edward Hotchkiss at Perkins Coie, LLP. By 11 October 2004, Mr. Hotchkiss indicated that he had forwarded a Power of Attorney to Accent Optical Technologies, Inc. for execution so that Perkins Coie, LLP would have power of attorney to transact with the U.S. Patent and Trademark Office on behalf of Accent Optical Technologies, Inc. Based on the understanding from Mr. Jackson that the present application was pending as of 18 March 2004, Perkins Coie, LLP, understood that there was no immediate outstanding action items in the present application.

In April 2004, I reviewed the file of the present application with respect to filing an executed Power of Attorney in the U.S. Patent and Trademark Office. Based upon my review I could not determine whether an assignment of the present application to Accent Optical Technologies, Inc., had been recorded. On 3 May 2005, Mr. Steve Whelan of Perkins Coie sent Mr. Jackson an email message inquiring whether an assignment transferring the rights to Accent Optical Technologies, Inc,. had been filed and recorded in the United States Patent and Trademark Office. On 4 May 2005, Mr. Jackson responded to Mr. Whelan stating that Mr. Jackson had reviewed his records and had not received any correspondence from the U.S. Patent and Trademark Office regarding any a recordation of such an assignment. On 20 June 2005, I called Examiner Pham at (571) 272-2426 to determine whether an assignment to Accent Optical Technologies, Inc., had been placed in the prosecution history of the present application in the U.S. Patent and Trademark

Office. During this call on 20 June 2005, Examiner Pham indicated that the application went abandoned on 4 August 2000 for failing to respond to the Office Action dated 5 January 2000. To the best of my knowledge, this was the first time anyone involved with prosecution of the present application was informed that the application was held to be abandoned by the U.S. Patent and Trademark Office. Therefore, the present petition is being filed within three months of first becoming aware that the present application had been held to be abandoned by the U.S. Patent and Trademark Office.

Based on the foregoing, the entire delay in filing the required reply from the due date for the required reply until the filing of a grantable petition under 37 CFR 1.137(b) was unintentional. The abandonment should accordingly be held to be inadvertent, and the enclosed copy of the Amendment and Response filed on 5 January 2000 should be entered and the case revived.

2. REPLY TO 5 JANUARY 2000 OFFICE ACTION

The response to the 5 January 2000 Office Action has already been filed in the United States Patent and Trademark Office and is attached in Exhibit A of the Declaration of David A. Jackson.

3. PETITION FEE

Our check in the amount of $750.00 covering the fee set forth in 37 CFR 1.17(m) is enclosed. The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 50-0665, under Order No. 427008007US. A duplicate copy of this paper is enclosed.

Dated: September 19, 2005

Respectfully submitted,

By _____

Paul T. Parker
Registration No.: 38,264
PERKINS COIE LLP
P.O. Box 1247
Seattle, Washington 98111-1247
(206) 359-8000
(206) 359-7198 (Fax)
Attorneys for Applicant

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Dated: 9/19/2005 Signature: Mike Navarro
(Mike Navarro)

Attorney Docket No. 2390-1-001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS:	Higgs, et al.	EXAMINER:	H. Pham
SERIAL NO	09/254,521	ART UNIT:	2877
FILED	March 8, 1999		
FOR	MICRO DEFECTS IN SEMI -CONDUCTORS		

Certificate of Mailing Under 37 CFR 1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to COMMISSIONER FOR PATENTS, P.O. BOX 1450, ALEXANDRIA, VA 22313-1450 on_____.

_____ _____
(Name of Person Mailing) (Signature and Date)

DECLARATION

COMMISSIONER FOR PATENTS
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450

Dear Sir:

I, DAVID A. JACKSON, hereby declare as follows:

1. I am an attorney at law of the states of Virginia and New Jersey. I am registered to practice before the U.S. Patent and Trademark Office.

2. I am a member of the firm of Klauber & Jackson LLC and was the responsible attorney for the above-identified application at the time relevant to the events that are the subject of this declaration.

3. At the time in question, a first Office Action had been issued, that required a response with a One-Month Extension by May 5, 2000. I received instructions from the client just prior to that deadline, and prepared and filed a response, together with a One-Month Extension, on May 5, 2000. Both the extension and response were forwarded by first class mailing in accordance with the requirements of 37 CFR 1.8. A true and correct copy of the response that I filed on May 5, 2000 is attached as Exhibit A.

4. We did not receive an acknowledgment of our filing, and on July 23, 2003, forwarded a first status inquiry. No response to our first status inquiry was received, and on April 16, 2004, we forwarded a second status inquiry. The second inquiry was also not answered. True and correct copies of the first and second status inquiries are attached as Exhibit B.

5. Throughout this period, we did not receive any correspondence from the USPTO as to the status of this application. We specifically did not receive a Notice of Abandonment of the present application at any time. During that time and continuing to this date, we maintain the same mailing address, and we regularly receive PTO correspondence on all of the other U.S. patent matters in our charge. Consequently, we had no reason to believe that the present application was abandoned.

6. On October 6, 2004, we transferred the physical file and responsibility for prosecuting the present application to Perkins Coie, LLP.

7. In August 2005, Mr. Paul Parker of Perkins Coie, LLP informed me that the United States Patent and Trademark Office had held this application to be abandoned as of August 5, 2000. This was the first notice of abandonment of the present application that I had received.

8. Based on the foregoing, I hereby affirmatively state that the entire delay in filing the required reply from the due date for the reply until the filing of a grantable petition pursuant to this paragraph was unintentional.

9. I further hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code; and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Dated: Sept. 19, 2005

David A. Jackson

EXHIBIT A

PATENT
2390-1-001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT(S)	:	HIGGS ET AL.		
SERIAL NO.	:	09/254,521	EXAMINER	: H. PHAM
FILED	:	MARCH 8, 1999	ART UNIT	: 2877
FOR	:	MICRO DEFECTS IN SEMI-CONDUCTORS		

CERTIFICATE OF MAILING UNDER 37 CFR 1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to the ASSISTANT COMMISSIONER OF PATENTS, WASHINGTON, DC 20231 on May 5, 2000.

David A. Jackson, Reg. No. 26,742
(Name of Registered Representative)

5/5/2000
(Signature and Date)

REQUEST FOR ONE MONTH EXTENSION OF TIME

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

Dear Sir:

Applicant hereby requests that the period for responding to the Office Action, dated January 5, 2000, now set to expire on April 5, 2000, be extended by one (1) month, so as to expire on May 5, 2000.

As Applicant is associated with a large entity, a check in the amount of $110.00 is enclosed to cover the one-month extension herein requested. The Commissioner is further authorized to charge any deficiencies or to credit any overages to Deposit Account No. 11-1153, and accordingly, this Request is submitted in duplicate.

Favorable action on this Request for Extension of Time is courteously solicited.

Respectfully submitted,

David A. Jackson
Attorney for Applicant
Registration No. 26,742

KLAUBER & JACKSON
411 Hackensack Avenue
Hackensack, NJ 07601
(201) 487-5800

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT(S)	:	HIGGS ET AL.			
SERIAL NO.	:	09/254,521	EXAMINER	:	H. PHAM
FILED	:	MARCH 8, 1999	ART UNIT	:	2877
FOR	:	MICRO DEFECTS IN SEMI-CONDUCTORS			

CERTIFICATE OF MAILING UNDER 37 CFR 1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to the ASSISTANT COMMISSIONER FOR PATENTS, WASHINGTON, DC 20231 on May 5, 2000.

David A. Jackson, Reg. No. 26,742
(Name of Registered Representative)

(Signature and Date)

AMENDMENT AND RESPONSE

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

Dear Sir:

In response to the outstanding Office Action dated January 5, 2000, having a due date for a response extended by one month so as to expire on or before May 5, 2000, please consider the following amendments and remarks. A Petition for a One Month Extension of Time is being filed concurrently herewith.

IN THE SPECIFICATION:

Please enter the following amendments:

On Page 1, line 2, please insert

– BACKGROUND OF THE INVENTION –;

On Page 4, line 7, please insert

– SUMMARY OF THE INVENTION – ;

On Page 5, line 15, please change "R_{π}" to – Rπ) –;

On Page 7, line 13, please change "structutre" to – structure –;

On Page 10, line 4, please insert

– BRIEF DESCRIPTION OF THE DRAWINGS –;

On Page 11, line 8, please insert

– DETAILED DESCRIPTION OF THE INVENTION –;

On Page 13, line 17, please insert –) – after "26";

line 23, please change "9" to – (–; and

On Page 14, lines 3 and 17, change "beamsplitter" to – beam splitter –.

IN THE CLAIMS:

Please amend the Claims as follows:

1. (Amended) A method for identifying defects in a [semiconductor or] silicon structure comprising exposing said [semiconductor or] silicon structure to at least one high intensity beam of light characterised by a spot size of between 0.1 mm - 0.5 microns and a peak or average power density of between 10^4 - 10^9 watts/cm^2; and collecting luminescence from the [semiconductor or] silicon structure so as to visualise and observe defects in same by production of an image, characterized in that non-radiative recombination of electron pairs is detected as darkened regions in the image at the physical point of the defect.

5. (Amended) An apparatus for undertaking photoluminescence imaging of a [semiconductor or] silicon structure characterised in that it comprises at least one high intensity light generating means which produces a beam of light having a spot size between

0.1 mm - 0.5 microns and a peak or average power density of between 10^4 - 10^9 watts/cm^2; a means for collecting luminescence from the [semiconductor or] silicon [wafer] structure and means for producing photoluminescence images of said [semiconductor or] silicon structure in the form of an image so as to visualize and observe any defects that may be present, characterized in that means for collecting photoluminescence enable detection of non-radiative recombination of electron pairs, as darkened regions in the image at the physical point of the defect.

7. (Amended) An apparatus according to Claim[s] 5 [or 6] wherein said light generating means is provided with modulation means whereby the intensity of said light beam may be selected.

Please add the following new claims:

-- 11. A method for identifying defects in a semiconductor other than a silicon structure (non-silicon semiconductor) comprising exposing said semiconductor to at least one high intensity beam of light characterized by a spot size of between 0.1 mm - 0.5 microns and a peak or average power density of between 10^4 - 10^9 watts/cm^2; and collecting luminescence from the semiconductor so as to visualize and observe defects in same by production of an image, characterized in that non-radiative recombination of electron pairs is detected as darkened regions in the image at the physical position of the defect.

12. A method according to Claim 11 comprising selecting the wavelength of said light so as to identify defects at a selective depth in said semiconductor.

13. A method according to Claim 11 wherein the high intensity beam of light is pulsed.

14. A method according to Claim 11 comprising collecting luminescence from a series of focal planes.

15. An apparatus for undertaking photoluminescence imaging of a other than a silicon structure (non-silicon semiconductor) characterised in that it comprises at least one high intensity light generating means which produces a beam of light having a spot size between 0.1 mm - 0.5 microns and a peak or average power density of between 10^4 - 10^9 watts/cm^2; a means for collecting luminescence from said semiconductor, and means for producing photoluminescence images of said semiconductor in the form of an image so as to visualize and observe any defects that may be present, characterized in that means for collecting photoluminescence enable detection of non-radiative recombination of electron pairs, as darkened regions in the image at the physical point of the defect.

16. An apparatus according to Claim 15 wherein said light generating means is provided with modulation means whereby the wavelength of said light beam can be selected.

17. An apparatus according to Claim 15 wherein said light generating means is provided with modulation means whereby the intensity of said light beam may be selected.

18. An apparatus according to Claim 15 wherein means is provided to enable the high intensity beam of light to be pulsed.

19. An apparatus according to Claim 15 wherein said light generating means is provided with modulation means whereby the frequency of said light beam may be selected.

20. An apparatus according to Claim 15 wherein said apparatus comprises confocal optics whereby images of said semiconductor or structure may be obtained through a series of focal planes. --

REMARKS

Reconsideration of this application is respectfully requested. Claims 1-20 as amended are presented for consideration.

Claims 1 and 5 have been amended with reference to the description at page 6 last paragraph to more clearly distinguish the nature of the photoluminescence (PL) technique employed. Also, Applicants have chosen to present independent claims addressing the silicon structures and those semiconductors that are not silicon structures. The latter are set forth in new Claims 11-20, which can be seen to essentially mirror Claims 1-10 in scope and content. As no new matter is believed to be inserted by the presentation of Claims 11-20, entry and favorable consideration thereof is requested. Lastly, all terms in the claims have been reviewed, and in the instance of the deletion of "wafer" in claim 5, the claim has been revised to assure correspondence in antecedent basis.

The Specification has also been amended to insert section headings, such as "Background of the Invention", "Summary of the Invention", and the like, as suggested by the Examiner. Also, minor typographical errors have been corrected, as recommended by the Examiner. The basis for all of the corrections is believed to be clear from the specification as filed, and entry and favorable consideration of these amendments is likewise requested.

The Claims are Definite

Claims 1-10 have been rejected under 35 USC 112, second paragraph, as indefinite with respect to three items. In particular, as Claim 1, line 6, reference herein to "image" is to an image in the conventional meaning of the word, as a visual representation of an object (silicon or semiconductor structure), the image derived with use of a PL imaging apparatus (microscope) as known in the art (see page 11, line 11). With respect to Claim 9, reference to "frequency" is to the frequency of the light beam as defined in Claim 5, generated by a high intensity light generating means in a PL imaging apparatus (microscope). Lastly, Claim 10 has been amended by the deletion of "may be" and its replacement with "are." Applicants believe that the above informalities have been resolved, and withdrawal of the rejection based on 35 USC 112 second paragraph, is in order and is requested.

The Claims are Unobvious

Claims 1-10 have been rejected under 35 USC 103(a) as unpatentable over Moore et al. (Journal of Crystal Growth, 103 (1990) 21027) in view of Fairand et al. (U.S. Patent No. 4,246,793). As this rejection may pertain to the claims, particularly as presently amended, it is traversed.

Moore et al was considered during the processing of the International (PCT) application, and it was concluded at that time that Moore et al provides no indication towards anything other than evaluating PL spectra at conventional (low) power density in order to provide a (PL) image of a semiconductor. The artisan would not contemplate increasing the power density of the applied light beam, since it is known in the art that this saturates the structure with resultant loss of resolution, and concomitant loss of contrast associated with defects. In support of this position, Applicants submit herewith the following articles:

Tajima, M. Journal of Crystal Growth, Vol. 103, Pages 1-7 (1990); and Miner, C. Semiconductor Science and Technology Vol. 7, Pages A10-A15 (1992), which are cited in their entireties for the disclosure supportive of the knowledge in the art referred to in the previous sentence, and as such, are directly appended hereto. Also, Applicants refer the Examiner to Pritchard et al. cited in the International Search Report of the parent PCT application, at Col. 1, line 13, for similarly supportive disclosure and recitation. A copy of Pritchard et al. is also enclosed for the Examiner's convenience.

Distinction of semiconductor type

Moore et al. relates in fact to non- silicon type structures and this distinction is significant. When detecting PL in non-silicon structures the artisan would not contemplate increasing the power density of the applied light beam, since it was known in the art at that time, that this saturates the structure with resultant loss of definition. As stated at the description at page 3 line 20, the artisan would not generally use a PL technique for Si structures because the luminescence emission of Si is approximately 10,000 times weaker and not detectable without a very specialized detection technique. A specialized PL technique for detection of PL from Si structures is disclosed in Tajima, *Id.*, and this recognizes that PL from impurities in Si structures can be detected.

Accordingly there is a considerable body of evidence in the art teaching away from using the method of Moore et al. at elevated power density for non-Si type structures, or at any power density for Si type structures.

Summary of the prior art and of the present invention

The following is a summary of the distinct techniques known in the prior art

documents and in the present application, for detecting two distinct defect types (physical (void) defects and point (random atom) defects) disclosed in the prior art and in the present application respectively.

Fairand et al. discloses a method of high power laser irradiation of steel blocks, generating ultrasound waves which are physically transmitted through the block and are scattered or reflected at physical flaws in steel blocks. In Fairand et al, the ultrasound energy is sufficiently amplified by use of high laser power to be detected by transducers.

Moore et al. discloses a method for evaluating the composition and quality of a non-silicon semiconductor structure using photoluminescence (PL) spectroscopy and a corresponding apparatus (see Moore, Figure 2), by means of scanning an exciting laser beam over the semiconductor surface and collecting the resulting PL spectrum, and using the spectrum to obtain spatial information regarding the semiconductor wafer. The PL emission in a semiconductor alloy is directly related to the alloy composition, and in this method the PL wavelength and intensity can be used to evaluate the composition and quality. As noted above, Moore et al. employs low excitation laser power to avoid saturation of the wafer and loss of definition.

Also, Tajima discloses a particular use of photoluminescense, as it is directed to a spectroscopic PL mapping technique for Si and GaAs wafers. There are a limited number of chemical impurities in these materials that can generate specific luminescence emissions. By mapping their spatial position, information about their spatial uniformity can be obtained.

By distinction, the present invention relates to a technique of laser irradiation of a Si or other semiconductor structure and detecting photoluminescence. The present technique is distinctive in that it monitors photoluminescence quenching (non-radiative recombination) caused by defects. In addition, this technique employs a high laser excitation power to

selectively enhance the non-radiative recombination at defects.

The Examiner argues that Fairand et al. discloses a non-destructive testing method using increased power density and that it would have been obvious to combine the increased power density of Fairand et al. in the method of Moore et al, for the reason of obtaining accuracy in detecting high temperature materials.

Applicans submit firstly, that it would not have been obvious to combine these teachings, and secondly that the combined teachings do not amount to the presently claimed process and apparatus.

The cited techniques are unrelated

Firstly therefore it should be appreciated that Fairand et al. has developed a non-contact method for detecting defects in hot steel billets. This technique is based on using a pulsed laser to generate an ultrasonic wave in the body of the material and then detecting the portion of the wave affected by defects. No detectable ultrasonic signals were observed if the excitation laser power was $<2 \times 10^7$ W/cm^2, and typical power densities of $>2 \times 10^8$ W/cm^2 are required. Fairand et al. relates to a totally different technique of detecting reflected and scattered ultrasonic waves by laser irradiation in the acoustic range from a solid and does not employ PL techniques at all.

It should however be appreciated that although both Moore et al. et al. and Fairand et al. disclose defect detection techniques, they are applied to different types of materials (semiconductors vs. steel) for detecting different types of defects (physical vs. point), and their methods (photoluminescence spectroscopy vs. ultrasonics) of detecting defects are also different. As a consequence of these differences, it cannot be said that Fairand et al. would provide any suggestion to use an elevated power density in the method disclosed by Moore et

al. Accordingly, applicants submit that it would not be obvious to combine the teaching of Moore et al. and Fairand et al. and that as a consequence, the claims are not obvious in the light of these two documents.

The cited techniques in combination do not disclose or suggest the invention.

Assuming arguendo, that the artisan chooses to increase the power density employed in the method of Moore et al, such an increase would simply saturate the defects, the intrinsic properties of the wafers would dominate and quantitative information would be lost. Accordingly the combination of Moore et al. and Fairand et al. fails to teach the present invention and would in fact, be a disincentive to the artisan to the use of the presently claimed method.

It is further submitted that the claims are not obvious when Moore et al. is considered independently of Fairand et al., as importantly, Moore et al. fails to appreciate the essence and purpose of the present invention. In particular with regard to this point.

The present invention derives from the realization that in semiconductors there are two main ways that charge carriers can recombine: radiative recombination (photoluminescence) or non-radiative recombination via heat generation. In the instance of direct band gap materials, photoluminescence is the dominant recombination process because the radiative recombination rate is much faster than the non-radiative recombination rate at defects. Under high excitation power densities the recombination at the defects saturates because it is much slower than the radiative process, and consequently, low excitation powers are required to see defects. In indirect band gap materials, the radiative process is slower than the non-radiative process and therefore defect recombination is dominant. Under high laser excitation the defect spectrum cannot be detected as it is masked by other luminescence peaks

and as a consequence, defects can no longer be detected. In general, the presence of a defect increases the amount of non-radiative electron-hole recombination, i.e. the amount of photoluminescence is reduced as the defect acts to quench this photoluminescence.

Conventional techniques such as Moore et al. (and Tajima, as well) use a linear response, as enhancing or reducing power density enhances or reduces the response in a linear fashion. The present invention however relies on a non-linear response whereby enhancing or reducing the power density differentiates two responses and gives a non-linear response. The information gained from the non-linear response identifies localized points in a crystal at magnified scale, and is clearly distinct from merely monitoring the presence of crystal non-uniformity. The information gained by point identification in the practice of the present invention, enables optimization of growth conditions for sample growth in higher quality.

Moore et al. has developed a non-destructive photoluminescence mapping system making use of only one of these ways for charge carriers to recombine, to characterize compound semiconductor materials (i.e. direct band gap materials). Moore et al. is concerned with measuring the uniformity of semiconductor composition and quality of the layer which is related to the presence of defects. Moore et al. uses low laser power densities (80μ watts over a 10 μm spot, approximately 200 w/cm^2) and teaches the importance of spectrally resolved data to fully characterize these materials. The need for low power densities is explained in the preceding paragraph and is also discussed in the literature; see C. J. Miner (1992) which states "When low excitation conditions are used (< 100 W/cm^2) the room temperature intensity is a sensitive measure of the density of the very defects that limit the performance of minority carrier devices. Indeed, when high excitation densities are the used the PL contrast associated with theses defects is lost". This is also present in Section 2.2 of the International Preliminary Examination Report that was issued in the parent PCT

application, and in R.E. Pritchard (1993) with regard to this matter.

In contrast, Tajima (1990) employed very low excitation laser power (< 1 W/ cm^2) to observe defects in silicon (an indirect band gap material) by means of photoluminescence spectral defect mapping.

The present invention employs a method making simultaneous use of both ways for charge carriers to recombine whereby a defect is imaged as a consequence of its alteration of the amount of non-radiative, electron-hole recombination when compared with that of a defect free part of the material. The use of high power laser densities selectively distinguishes the nature of charge carrier recombination and enhances the defect contrast using the technique of the invention, whereas in Moore et al., detecting only a single recombination technique, selection is not possible and the use of high laser power would actually prevent defect imaging.

From the foregoing, it is clear that Moore et al., whether considered alone, or in combination with Fairand et al. fails to appreciate the concept and objective of the present invention, and can much less be relied on for a suggestion for its development and practice. Accordingly, reconsideration and withdrawal of the rejection based on Moore et al. and Fairand et al. is in order, and is requested.

Comment on dependent claims

The Examiner is directed to the features of the dependent method claims, and the corresponding apparatus claims.

The dependent method claims define a particular aspect of the invention in which the wavelength of incident laser radiation is selected according to a desired layer depth within the wafer, to detect defects at that depth and create a 3D map. The defect detection depth below

the sample surface is altered simply by altering the laser excitation wavelength. This is a further distinguishing feature of the invention and is neither disclosed nor suggested in the cited documents. Specifically, from the teachings of Moore et al., one would be prompted to select the wavelength of radiation to maximize the intensity of PL signal, and not to distinguish between Intensity of wafer and defect nor to create a 3D image of the wafer, imaging the defects at given depths.

Corresponding apparatus claims define a particular aspect of the apparatus in which a high signal to noise ratio is attained by rejecting all dc light and eliminating noise. This would not be relevant to linear techniques since no distinction would be obtained thereby, and hence it is a feature that is further reflective of the patentably distinct of the present invention providing advantages specific to this technique.

Accordingly it is submitted that the present invention as claimed is inventive and we respectfully request reconsideration by the Examiner.

Fees

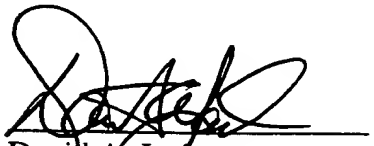
No fees are believed to be necessitated by the instant response, apart from the request for a one (1) month time extension, that is submitted herewith. However, should this be in error, authorization is hereby given to charge Deposit Account No. 11-1153 for any underpayment, or to credit any overpayments.

CONCLUSION

Applicants respectfully request entry of the foregoing amendments and remarks in the file history of the instant Application. The Claims as amended are believed to be in condition for allowance, and reconsideration and withdrawal of all of the outstanding rejections is therefore believed in order. Early and favorable action on the claims is earnestly solicited. Should a discussion aid in the prosecution of the application, the Examiner is invited to

telephone the undersigned at (201) 487-5800, to effect a resolution.

Respectfully submitted,



David A. Jackson
Attorney for Applicants
Registration No. 26,742

KLAUBER & JACKSON
411 Hackensack Avenue
Hackensack NJ 07601
Tel: (201) 487-5800

ENCLOSURES:

Tajima, M. Journal of Crystal Growth, Vol. 103, Pages 1-7 (1990)
Miner, C. Semiconductor Science and Technology Vol. 7, Pages A10-A15 (1992)

EXHIBIT B

Serial No 09/254,521 File No 2390-1-001 By DAJ/RR/ls

Title MICRO DEFECTS IN SEMI CONDUCTORS

In the Matter of the Application of Victor Higgs, et al.

The following was received in the U.S. Patent & Trademark Office on the date stamped hereon:

VIA FIRST CLASS MAIL

- ☐ Transmittal Sheet/Cover Ltr.
- ☐ Application For Patent
- ☐ Declaration ☐ Affidavit
- ☐ Drawings ☐ Sheet(s)
- ☐ S.E. Verified Statements
- ☐ Assignment
- ☐ Check for $ _____
- ☐ Letter ☐ Missing Parts
- ☐ Priority Document
- ☐ Amendment ☐ Response
- ☐ Extension of Time
- ☐ Issue Fee Transmittal
- ☐ Maintenance Fee
- ☐ Appln. TM Registration
- ☐ 8 & 15 Declaration
- ☐ Renewal Application
- ☐ Notice of Appeal
- ☐ Brief ☐ Petition
- ☐ Power of Attorney
- ☒ STATUS INQ.

Mailed 7/23/03

PATENT
2390-1-001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT(S)	:	HIGGS ET AL.			
SERIAL NO.	:	09/254,521	EXAMINER	:	H. PHAM
FILED	:	MARCH 8, 1999	ART UNIT	:	2877
FOR	:	MICRO DEFECTS IN SEMI-CONDUCTORS			

Certificate of Mailing Under 37 CFR 1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to COMMISSIONER FOR PATENTS, P.O. Box 1450, Alexandria, VA 22313-1450 on July 23, 2003.

Lois A. Snure
(Name of Depositor)

Lois Snure July 23, 2003
(Signature and Date)

STATUS INQUIRY

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Please be so kind as to advise the undersigned of the status of the above-identified application, and as to when an Action will be received.

Respectfully submitted,

DAVID A. JACKSON
Attorney for Applicant
Registration No. 26,742

Klauber & Jackson
411 Continental Plaza
Hackensack, NJ 07601
(201)487-5800

Serial No. 09/254,521 File No. 2390-1-001 By DAJ/RR/ls

Title MICRO DEFECTS IN SEMI CONDUCTORS

In the Matter of the Application of Victor Higgs, et. al.

The following was received in the U.S. Patent & Trademark Office on the date stamped hereon:

VIA FIRST CLASS MAIL

- ☐ Transmittal Sheet/Cover Ltr.
- ☐ Application For Patent
- ☐ Declaration ☐ Affidavit
- ☐ Drawings ☐ Sheet(s)
- ☐ S.E. Verified Statements
- ☐ Assignment
- ☐ Check for $ _____
- ☐ Letter ☐ Missing Parts
- ☐ Priority Document
- ☐ Amendment ☐ Response
- ☐ Extension of Time
- ☐ Issue Fee Transmittal
- ☐ Maintenance Fee
- ☐ Appln. TM Registration
- ☐ 8 & 15 Declaration
- ☐ Renewal Application
- ☐ Notice of Appeal
- ☐ Brief ☐ Petition
- ☐ Power of Attorney
- ☒ Status Inquiry

Mailed 4/16/04

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to COMMISSIONER FOR PATENTS, P.O. Box 1450, Alexandria, VA 22313-1450 on April 16, 2004.

Lois A. Snure
(Name of Depositor)

Lois Snure April 16, 2004
(Signature and Date)

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